
CHAPTER III. MANPOWER SUPPLY AND COSTS

As Chapter II showed, the Navy will need to add about 45,000 enlisted personnel to its active-duty force by the end of 1988 in order to carry out its planned expansion. This chapter discusses the key assumptions regarding factors that will influence recruiting and retention, and presents estimates of the total supply of enlisted personnel. Officers, reserve, and civilian personnel are less likely to be in short supply. ^{1/} The chapter also estimates the pay and retirement costs of the expanded Navy.

KEY ASSUMPTIONS ABOUT ENLISTED SUPPLY

Several factors will affect the supply of enlisted personnel and, hence, the ability of the Navy to meet its requirements. This study's assumptions about each key factor are noted below. Appendix A discusses the assumptions in more detail and describes the methods used to project enlisted supply.

- o Navy Demand for Enlisted Personnel. The study assumes that the Navy attempts to meet demands discussed in Chapter II by accepting all qualified recruits and reenlistees.
- o Demand for Enlisted Personnel in Other Services. The numbers of recruits willing to enter the Navy will be influenced by the recruit demands of the other services, particularly by the Air Force, which offers valuable training for many jobs in the civilian sector. This study assumes that the other services carry out the five-year buildup in forces requested in the President's January 1983 budget. For the Air Force, this would mean growth in their enlisted force from 500,000 in 1984 to 526,000 by 1988.

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1. Although recruitment of naval officers does not appear to be a problem at this time, retention of middle-grade officers, O-4 to O-6, in selected occupations may become more difficult as requirements grow. For example, see an analysis of nuclear submarine officer manpower supply in Gordon R. Dickens, Manning the Nuclear Submarine Force of the 1980s and Beyond: An Officer Study, Master's Thesis (Naval Postgraduate School, June 1982).

- o Pay Raises. The size and distribution of pay raises influences recruiting and retention. This study assumes that military personnel receive a 4 percent pay raise in January 1984 and that raises beyond 1984 keep pace with those in the private sector. All raises are assumed to be provided "across the board"--that is, in equal percentages for all enlisted personnel. (The absence of a pay raise for junior personnel, which the Congress may mandate in the 1984 DoD Authorization Bill, would not significantly affect these results unless it was continued beyond 1984.)
- o Labor Market Conditions. Falling unemployment makes retention and recruiting more difficult because more persons leave the military to pursue civilian opportunities and fewer recruits are willing to join. This study assumes that unemployment follows CBO's August 1983 projection, which shows overall unemployment falling from 8.6 percent in 1984 to 7.6 percent by 1986. 2/

SUPPLY OF CAREER PERSONNEL

Based on these assumptions, over the five years between fiscal years 1983 and 1988, the Navy would add 40,000 personnel to its enlisted career force (see Table 6). The growth would be concentrated in the first three years, 1984-1986, when 30,000 people would be added. Table 6 also shows the Navy's current career force objectives--measured as 49 percent of total enlisted strength. Enlisted supply would fall short of this objective through 1987.

Reaching the 49 percent career force objective would allow the Navy to eliminate its past shortfall of experienced enlisted personnel--the oft-cited "petty officer shortage." (Petty officers are fully trained enlisted personnel in grades E4-E9. The Navy has maintained in past years that available petty officers were 20,000 below the required number.) The need for this higher career content is difficult to evaluate (during the last decade, the career force has averaged only 41 percent of the total enlisted force each year). Studies of the relative productivity of first-term as

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2. See Congressional Budget Office, The Economic and Budget Outlook: An Update (August 1983). CBO's latest published projections do not include years beyond 1986. To provide estimates through 1988, earlier CBO estimates from January 1983 (which included 1987 and 1988) were revised to reflect the latest forecasts. These revisions show unemployment falling to 6.9 percent in 1988.

against career personnel suggest that, in skills where high training costs prevail, it is often possible to achieve cost savings, with no loss of capability, by substituting more experienced for less experienced personnel. ^{3/} However, the need to plan for wartime mobilization--when the demand for low-skill jobs would increase rapidly--and the traditional emphasis on youth in the Navy imply that economic considerations alone may be too narrow a focus for determining the best mix of personnel.

Nevertheless, there is one important reason for pursuing a higher career content. Over the next twelve years, Navy recruiting will face a decline in the primary pool of recruits--male high school graduates who score in the top three categories on the entrance examination. One way to offset this decline and maintain high recruit quality is to increase the retention of career personnel, thus reducing the number of recruits needed. Projections of Navy recruiting results are presented in the following section assuming that the career retention results shown in Table 6 are achieved.

TABLE 6. ESTIMATED NUMBER OF NAVY ENLISTED CAREER PERSONNEL WITH MORE THAN FOUR YEARS OF SERVICE
(By fiscal year, in thousands)

	1983	1984	1985	1986	1987	1988
Navy Objective <u>a/</u>	239	244	249	254	256	259
Estimated Number	219	233	244	249	255	259

- a. Equal to 49 percent of enlisted personnel requirement shown in Table 3.

3. See, for example, studies by Donald B. Rice, Defense Resource Management Study: Final Report, prepared for the Secretary of Defense (February 1979), Chapter IV; Mark J. Albrecht, Labor Substitution in the Military Environment: Implications for Enlisted Force Management (The Rand Corporation, November 1979); and A.J. Marcus, Personnel Substitution and Navy Aviation Readiness (Center for Naval Analyses, October 1982).

SUPPLY OF RECRUITS

The Navy and the other military services can almost always meet their demands for numbers of recruits, but attracting high-quality recruits is frequently a challenge. Thus, a commonly used measure of recruiting success is the percentage of male recruits without previous service who hold high school diplomas. Educational attainment is an important indicator of recruit quality because high school graduates are more likely than nongraduates to succeed in the Navy. (Among graduates, the rate of attrition--or failure to complete the first term of enlistment--is roughly half that of nongraduates.)

If the Navy meets its total requirements for recruits, then under the assumptions discussed above, the proportion of "scarce" recruits--males with no previous service who hold high school diplomas--is projected to reach 82 percent in 1983 and 87 percent in 1984 (see Table 7). Beyond 1984, the projections show a steady decline reflecting a constant demand for new recruits--roughly 100,000 each year--and a declining supply of scarce recruits. Table 7 also compares the projected recruiting results to those achieved during 1980-1982, when the percentage ranged from 73 to 77. Although the Navy does not formally stipulate the percentage of male high school graduate recruits it wants, the results for the previous three years suggest a standard by which to evaluate the projections. Under these assumptions, the Navy would exceed its past recruiting results in 1984 through 1988.

TABLE 7. ESTIMATED PERCENTAGES OF MALE RECRUITS WITHOUT PREVIOUS SERVICE AND WITH HIGH SCHOOL DIPLOMAS
(By fiscal year)

	Actual			Estimated					
	1980	1981	1982	1983	1984	1985	1986	1987	1988
Estimated Percentage	73	74	77	82	87	82	81	81	79

NOTE: To make these projections, the Navy's enlisted requirements were adjusted to account for recruiting of full-time reserve personnel (TARS).

If CBO estimates prove optimistic, the Navy could increase the number of female recruits or recruits with previous military service, since neither group is now in short supply. Such policies would reduce the demand for male recruits with no previous service, and so improve the percentages in Table 7. They might, however, produce unwanted consequences for Navy personnel management. For example, they could breach the present limits on the number of women serving in non-traditional jobs, or make promotion slower as larger numbers of recruits with prior service entered mid-career pay grades.

Recruiting and Retention Problems by Skill

As the buildup proceeds, recruiting and retention problems may be encountered for some skills although manpower goals overall are met. The Navy currently uses enlistment and reenlistment bonuses to increase compensation in occupations where problems arise. These payments may need to rise as the fleet expands, but the costs are likely to be modest relative to the total increase in Navy personnel costs.

COSTS UNDER THE NAVY'S PLAN

Meeting increased Navy manpower needs will, of course, raise costs in several budget accounts. Active-duty and reserve pay and allowances, subsistence-in-kind, permanent change-of-station costs, and government contributions to Social Security are funded in the military personnel (MPN, RPN) accounts. Payments to Navy retirees, both active and reserve, are funded separately in the military retired personnel account on a pay-as-you-go basis. This means that retirement outlays over the next five years will be virtually unaffected by the Navy's buildup since they are determined only by past manpower policies and do not reflect current manpower levels. However, the additional manpower will increase future retirement obligations and, under an accrual system that budgeted for future obligations, these increases would be reflected in the budget immediately as accrual costs.

Navy civilian costs are funded primarily in the industrial fund and operations and maintenance accounts, but are also included in the family housing, military construction, and research and development accounts. Included in these costs are salaries for both general-schedule and wage-board employees. Unless otherwise specified, all costs in this study reflect budget authority.

Military Personnel Costs

To accomplish the buildup, CBO estimates that the Navy's military manpower costs will rise from \$12.5 billion in 1984 to \$16.7 billion in 1988 (see Table 8). Costs would total \$73.2 billion over the five-year period. These estimates are in current fiscal year dollars and assume that all personnel receive a 4 percent raise in January 1984 and comparability pay increases thereafter, adjusted for CBO's estimates of inflation over the five-year period. These estimates include active-duty and reserves and both enlisted and officer personnel.

TABLE 8. PROJECTED COSTS OF NAVY MILITARY PERSONNEL UNDER THE ADMINISTRATION PLAN, FISCAL YEARS 1984-1988
(In millions of current dollars)

Type of Personnel	1984	1985	1986	1987	1988	Total 1984-1988
Active Duty	11,700	12,760	13,710	14,620	15,510	68,300
Reserve	<u>760</u>	<u>890</u>	<u>990</u>	<u>1,100</u>	<u>1,200</u>	<u>4,940</u>
Total	12,460	13,650	14,700	15,720	16,710	73,240

NOTE: The projections assume the following annual pay raises: 1984, 4 percent; 1985, 5.4 percent; 1986, 5.3 percent; 1987 and 1988, 5.2 percent.

The costs of Navy military retired pay will also be affected by the buildup. Under an accrual accounting system--which budgeted today for future retirement obligations--the costs of retired pay would rise from \$3.9 billion in 1984 to \$5.3 billion in 1988 and total \$23.2 billion over the five-year period (see Table 9). Although today's appropriations for retired pay are made on a pay-as-you-go basis--and thus would not be affected by the

buildup over the next five years--the 1984 DoD Authorization Bill may require accrual charges to be included in fiscal year 1985. ^{4/}

Civilian Costs

CBO estimates that salaries for Navy civilians would rise from \$7.9 billion in 1984 to \$10.0 billion in 1988 (see Table 10). Retirement costs would also rise. The Office of Personnel Management estimates that the normal cost percentage of the total civilian payroll that would be required

TABLE 9. PROJECTED RETIREMENT ACCRUAL CHARGES FOR NAVY MILITARY PERSONNEL UNDER THE ADMINISTRATION PLAN, FISCAL YEARS 1984-1988 (In millions of current year dollars)

Type of Personnel	1984	1985	1986	1987	1988	Total 1984-1988
Active Duty	3,649	3,935	4,213	4,478	4,725	21,000
Reserve	<u>292</u>	<u>325</u>	<u>361</u>	<u>403</u>	<u>427</u>	<u>1,808</u>
Total	3,941	4,260	4,574	4,881	5,152	22,808

NOTE: Under accrual accounting rules (which may be required in the 1984 DoD Authorization Bill), the budget would show the amount that would have to be set aside to fund in full retirement liabilities that military personnel earn each year. The "normal cost" percentage--an actuarial measure used to compute accrual charges--is 50.7 percent of basic pay in the table above.

4. See Congressional Budget Office, Accrual Accounting For Military Retirement: Alternative Approaches, Staff Working Paper (July 1983) for a complete discussion of accrual budgeting.

to fully fund retirement benefits is 35.2 percent. ^{5/} Under accrual accounting, the retirement costs would increase from \$2.5 billion in 1984 to \$3.2 billion in 1988 and total \$14.5 billion over the five-year period.

TABLE 10. PROJECTED PERSONNEL COSTS FOR NAVY CIVILIANS,
FISCAL YEARS 1984-1988 (In millions of current year dollars)

Cost Category	1984	1985	1986	1987	1988	Total 1984-1988
Salaries ^{a/}	7,900	8,510	9,050	9,550	10,040	45,050
Retirement Costs Under Full Accrual Accounting ^{b/}	2,530	2,730	2,910	3,060	3,220	14,450

- a. Pay raise assumptions for Navy civilians are the same as those for military personnel. See footnote to Table 8.
- b. The "normal cost" percentage used to compute civilian retirement accrual charges is 35.2 percent. Since employees contribute 7 percent, the government's liability is 28.2 percent of total civilian salaries. The estimates cover U.S. direct-hire employees only--about 91 percent of all Navy civilian employees.

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5. Actuarial comparisons of retirement costs are based on the present value of projected benefits. The normal cost measures the percent of the annual payroll necessary to fund the retirement benefits that employees earn in each year. See Congressional Budget Office, Adjustments in Federal White-Collar Pay: A Technical Review of Past Proposals and the Outlook for October 1983, Staff Working Paper (March 1983), pp. 11-14.

CHAPTER IV. ALTERNATIVE MANPOWER POLICIES AND POTENTIAL SAVINGS

The analysis in Chapter III shows that the Navy should be able to obtain the manpower it needs to support the planned buildup of the fleet through 1988 with, at most, modest changes in current personnel policies. But the manpower buildup will add substantially to costs at a time when the Congress is seeking ways to curb the growth in defense spending. This chapter examines ways the Navy could adjust its manpower policies to meet most fleet manning goals while also reducing the growth in personnel costs.

One such approach would limit pay raises, but partially offset these limits with higher bonuses for enlistment and reenlistment. Another option would shift the mix of deployable ships toward the reserve force. A third approach would lengthen the average sea tour, thus reducing the demand for active-duty personnel in shore rotation billets, while offsetting adverse effects on career retention with higher sea pay.

LIMIT PAY RAISES AND INCREASE BONUSES

The cost estimates presented in Chapter III assume that all federal workers--military and civilian--receive a 4 percent pay raise in January 1984, and raises comparable to average private-sector increases thereafter. However, the Congress may choose to continue the limits on annual military pay raises beyond the current budget year. The Congress could, for example, limit pay raises through 1988 to 4 percent a year. This policy was suggested by the First Concurrent Resolution on the Budget for 1984, which assumed 4 percent raises in January of each year (1984-1986) covered by the resolution.

Limits on pay would adversely affect recruiting and retention. To partially offset these effects, the Congress might increase enlistment and reenlistment bonuses for enlisted personnel. ^{1/} Such a policy would hold

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1. Enlistment bonuses are paid to qualified recruits who agree to serve in designated occupations. These bonuses are generally limited to \$2,500 or less. Selective reenlistment bonuses (SRB) have been used by the services since 1965. The bonus is paid in selected occupations that

down personnel costs and would also target incentives toward those recruits and career personnel in greatest demand during the buildup. (Bonuses are paid only to personnel in occupations with manpower shortages.) In addition, future retirement costs would be reduced below the level of obligations incurred under a policy of full-comparability raises. 2/

Effects on Costs

Placing limits on pay raises would reduce costs substantially. Extending the 4 percent pay raise limit through 1988 would yield the Navy savings totaling \$1.8 billion over the five-year period (see Table 11). These savings would be substantially larger if the pay raise limits were applied to the other services, as would be likely.

A 4 percent pay raise limit continued through 1988 would, however, cause a substantial decline in enlistments and reenlistments. CBO estimates that reenlistment rates for enlisted personnel with 5 to 12 years of service--those most likely to be affected by pay raise limits--would decline by 10 percent by 1988 if pay raises were limited to 4 percent over the next five years. To offset this decline for the occupations currently receiving

experience shortfalls in manning. The size of the bonus may be as high as \$20,000 and is calculated by multiplying the number of years in the reenlistment period by monthly basic pay. This total is then multiplied by a "skill multiple" from 1 to 6, which is set by the Navy according to the severity of the manning shortfall. In fiscal year 1983, 50 percent of all Navy reenlistments were eligible for the bonus; the average payment is estimated to be \$11,100. Officers who serve in designated occupations also receive special pay and/or bonuses. For example, medical corps officers are eligible to receive additional pay for each year of continued service past their initial period of obligated service, while nuclear-trained officers receive a \$3,000 bonus upon completion of training and annual bonuses for continued service.

2. "Comparability" raises refer to the size of the annual pay raises given to private-sector workers who perform similar jobs. Although these raises will generally be different for enlisted and officer personnel, and for blue-collar and white-collar civilians in the Navy, one commonly used measure of comparability is the increase in compensation received by non-farm production workers. CBO's cost estimates are based on projections of these increases consistent with the economic forecast of January 1983.

TABLE 11. EFFECTS OF ALTERNATIVE PAY RAISE POLICIES
ON COSTS OF NAVY MILITARY PERSONNEL,
FISCAL YEARS 1984-1988
(In millions of current dollars)

Pay Raise Policy	1984	1985	1986	1987	1988	Total 1984-1988
4 Percent Raise in 1984 and Comparability Raises Thereafter <u>a/</u>	360	1,200	1,960	2,775	3,625	9,920

Savings (Costs) Under Pay Raise Limits and Increased Bonuses						
4 percent raises, 1984-1988	0	180	270	575	795	1,820
Additional bonuses <u>b/</u>	<u>0</u>	<u>(+55)</u>	<u>(+85)</u>	<u>(+120)</u>	<u>(+155)</u>	<u>(+415)</u>
Total Savings	0	125	185	455	640	1,405

- a. Pay raises for military personnel are assumed to be: January 1984, 4 percent; 1985, 5.4 percent; 1986, 5.3 percent; 1987 and 1988, 5.2 percent.
- b. Bonus costs represent total new obligations rather than current year budget authority. Reenlistment bonuses are paid in installments over the term of reenlistment. Thus, current year budget authority will include past obligations.

bonuses, the average selected reenlistment bonus (SRB) payment in 1983 dollars would need to rise from \$11,100 (the average budgeted for 1983) to \$15,000 in 1988. 3/

This increase would, of course, add to costs. CBO estimates that the Navy will need to reenlist between 40,000 and 55,000 enlisted personnel each year through 1988 to support the buildup. Assuming that 50 percent of these reenlistments occur in occupations eligible for the bonus (roughly the percentage eligible in 1983), the Navy's budget for SRB would increase by \$145 million in 1988 and by \$375 million over the five-year period 1984 to 1988 (measured in current dollars).

Higher reenlistment bonuses would help correct manpower shortages, but only in skills eligible for the bonuses. Reenlistments in skills not eligible for SRB would decline as a result of pay raise limits. So would the willingness of recruits to enter the Navy. (CBO estimates that the percent of male high school graduates without prior service would fall from 79 percent under comparability raises to 70 percent by 1988.) Consequently, overall recruiting needs would rise, necessitating higher enlistment bonuses. By 1988, this could increase annual enlistment bonus costs by \$10 million. 4/ Together, the total additional bonuses--enlistment and reenlistment--would add \$55 million in 1985, \$155 million in 1988, and \$415 million over the entire five-year period (see Table 11).

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3. This calculation assumes an average enlisted pay grade of E-6 (with eight years of service), a base reenlistment rate of 50 percent, and a pay elasticity of 1.75. The pay elasticity measures the percentage change in reenlistment rates for a given change in military pay. A number of studies have estimated pay elasticities that range between 1.0 and 3.0 for different age groups. The estimates used here represent a weighted average of the first- and second-term elasticities given in David Rodney and others, The Impact of Selective Reenlistment Bonuses Upon First- and Second-Term Retention (Rehab Group, Inc., July 1980). See also the comprehensive discussion of the influence of pay on Navy reenlistments in Warner and Simon, The Empirical Analysis of Pay and Navy Enlisted Retention in the AVF (Center for Naval Analyses, December 1979).
 4. This estimate assumes a pay elasticity of 1.0 for Navy high school graduate enlistments, and 4,300 payments annually (the average number for 1980 through 1982). Average enlistment bonus payments would increase from \$1,750 in 1984 to \$2,620 in 1988.

Despite these higher bonus costs, the combination of limits on pay raises and higher bonuses would eventually save substantial sums. Savings would amount to \$640 million in 1988 and would total \$1.4 billion over the five years 1984-1988 (see Table 11).

Precedent for Higher Bonuses

Increasing bonuses to solve military manpower problems is not without recent precedent. Navy enlistment bonus payments rose sharply in 1980 and 1981 as recruiting became increasingly difficult; in 1983, when the recruiting situation improved dramatically as the result of rising private-sector unemployment and higher military pay, enlistment bonuses were virtually eliminated. Thus, increasing enlistment bonuses in the future would simply return to a policy of recent years.

Selective reenlistment bonus payments in the Navy have also risen rapidly during recent years, from under 10,000 new payments in 1979 to over 26,000 in 1982, even though retention has improved during the past two years. Two factors account for this. First, the Navy has been attempting to boost career retention significantly to fill past shortages and provide for fleet expansion. Second, in 1981 the Congress approved second- and third-term reenlistment bonuses (paid to personnel who have already reenlisted once and do so again after completing eight to twelve years of service) and thus increased the proportion of the enlisted force eligible to receive the SRB. This option would thus represent the continuation of a compensation policy that already relies heavily on reenlistment bonuses.

Possible Disadvantages

Substituting bonuses for pay raises would have some disadvantages. Since not all occupations are eligible for bonuses, the total number of career personnel would be lower than if comparability pay raises were given. CBO estimates that by 1988 the career force would be smaller by 4,000 under the bonus substitution policy. Under this study's economic assumptions (with unemployment falling to 6.9 percent by 1988), the Navy would fall short of its career force goal of 258,000. However, this aggregate deficiency would be made up of some skills that are overmanned and others that are short. The Navy could use its expanded bonus resources to ensure that critical skills are fully manned with career personnel, and might be able to reallocate bonus resources to retrain those in overmanned skills into those that are short.

Higher bonuses would also exacerbate a problem frequently noted by critics of the bonus program, namely that some Navy personnel would receive substantially higher pay than others who faced the same risks in wartime. On the other hand, total bonuses in 1988 would amount to only about 4 percent of Navy military personnel costs. This level of skill differential pay may be reasonable in light of the need to hold down costs while keeping the Navy competitive with the private sector for highly skilled personnel.

ALTERNATIVE MANPOWER POLICIES

The relationship between Navy military manpower requirements and force levels is not rigid, as the discussion of requirements in Chapter II indicated. Requirements result in part from the number of ships and air squadrons the Navy operates. But they are also affected by policies regarding fleet organization and personnel utilization. This is particularly true for active-duty manpower, for whom assignment policies determine the rates at which personnel are trained, moved, and promoted through the system. Two options that the Navy has used in the past are discussed below: transferring ships to the reserve force, and reducing the number of active-duty personnel assigned to shore duty by lengthening sea tours.

Transfer Ships to the Naval Reserve Force

Substituting reserve personnel for active-duty personnel would be one way to reduce the Navy's requirements for active-duty manpower. The Navy is currently planning to introduce 25 ships into the reserve force from 1983 to 1988. Fifteen ships currently in the reserve force will be retired, leaving a net gain of ten ships over the five-year period. The majority of these additions will be frigate-class ships designed for antisubmarine warfare operations. Table 12 shows the details of the Navy's plan.

The Navy could transfer additional ships to the reserve force and thereby reduce its requirements for active-duty manpower. Several factors would influence the decision to make such transfers. First, the ships selected should have enough remaining service life to permit a useful period for training in the reserve fleet. Second, to maintain the most capable ships in the active fleet, ships transferred to the reserves should be older and hence have less operational capability than the more recent ship designs. And third, the Navy should possess sufficient total numbers of ships in each class such that transfers to the reserve force would not place undue stress upon peacetime operating schedules. Reserve ships, even with crews including 65 percent active-duty personnel, cannot be routinely deployed in peacetime.

TABLE 12. NAVAL RESERVE FORCE: NAVY PLAN,
ADDITIONS TO THE NAVY PLAN, AND RESULTING
ACTIVE-DUTY MANPOWER REDUCTIONS,
FISCAL YEARS 1983-1988

	1983	1984	1985	1986	1987	1988
Number of Ships						
Present Navy Plan						
Amphibious (LST, LSD)	2	2	2	2	2	2
Mine warfare (MSO, MSH, MCM)	18	18	17	18	15	16
Frigates (FF, FFG)	6	9	11	15	19	24
Destroyers (DD)	1	1	1	1	1	1
Support	<u>6</u>	<u>6</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>
Total Ships, Navy Plan	33	36	32	37	37	43
Additions to the Navy Plan						
Amphibious (LST, LSD)	0	2	3	4	5	6
Destroyers (DDG-2)	0	2	4	6	8	10
Battleships	0	1	2	2	3	4
Total Ships, Alternative Plan	33	41	41	49	53	63

Number of Personnel						
Active-Duty Manpower Reductions Under Alternative Plan <u>a</u> /						
Sea	0	1,425	2,750	3,200	4,525	5,800
Shore	<u>0</u>	<u>900</u>	<u>1,750</u>	<u>2,050</u>	<u>2,875</u>	<u>3,700</u>
Total	0	2,325	4,500	5,250	7,400	9,500

- a. These estimates assume active ship manning levels of 370 for each destroyer (DDG-2), 225 for each amphibious ship (LST), and 1,650 for each battleship.

Two classes of ships--other than the frigates already transferred--might meet all three of these criteria:

- o DDG-2-class destroyers. Commissioned between 1960 and 1963, 6 of the 23 destroyers in this class have undergone overhauls to improve their anti-aircraft capabilities. The remaining 17 will begin reaching their end of service in 1990. Since they are less capable than the newer Spruance class, and the Navy currently has 69 destroyers in total, some transfers to the reserve force may be possible.
- o Amphibious vessels (LST, LSD). The Navy currently has 33 ships in these two classes, of which two are assigned to the Naval Reserve Force. These ships were commissioned between 1969 and 1972 and will begin reaching their end of service in the early 1990s. The Navy also plans to build nine additional LSD-class ships between 1983 and 1988; with these additions, it may be possible to transfer some of the older ships of both classes to the reserve force.

In addition to these two ship classes, the Navy is currently planning to reactivate three battleships to join the New Jersey, which entered active service for the third time this year. Since a primary mission of battleships is shore bombardment during a conflict, they might be candidates for transfer to the reserves. If all four were placed in the reserve force, approximately half of the increase in active-duty manpower--about 3,000 billets in all--could be avoided between 1984 and 1988.

Specifically, the alternative to the Navy's plan discussed in this study would transfer an additional ten destroyers, six amphibious ships, and four battleships to the reserve force between 1984 and 1988 (see Table 12). These transfers would reduce the number of ships in the active fleet by 15, 20, and 100 percent for the three ship classes, respectively. At the end of the five-year period, the reserve force would total 63 ships, 20 more than under the Navy's current plan. Assuming that each reserve ship carried a crew of 50 percent active-duty and 50 percent reserve personnel (as directed by the Congress for reserve frigates), the total reduction in active-duty manpower would be 1,425 in 1984, growing to 5,800 in 1988. If, in addition, enlisted rotation shore billets were also eliminated, the total reduction would be 9,500 billets in 1988 (see Table 12). On the other hand, reserve billets would grow by 1,425 in 1984 and 5,800 in 1988.

Even after paying for additional reserves, transferring additional ships to the reserves would reduce personnel costs by a net of \$18 million in 1984 and about \$391 million over the period 1984 to 1988 (see Table 15).

Moreover, personnel savings could be larger to the extent that already-planned increases in the Navy reserve (32,000 over 1984-1988) could be used to man the additional ships.

Operating costs would also decrease, since reserve ships steam for much shorter periods than active ships. CBO estimates that under this option annual savings in operations and maintenance costs would be \$72 million in 1984, rising to \$350 million by 1988.

Possible Problems. Transferring more ships to the reserve force would reduce the ships available to deploy in peacetime even though overseas commitments seem unlikely to decrease. The Navy could offset this reduction in available active ships by deploying those that remain in the active fleet for longer periods. This would increase the time spent at sea and adversely affect retention of career personnel. On the other hand, the Navy could accommodate the transfer by deploying slightly fewer ships to each overseas operating area in peacetime, thus keeping up the number of commitments and avoiding extensions of sea tours. Since the transfer of 20 more ships by 1988 to the reserves would mean a reduction of only 3.5 percent in active-duty ships available for deployment, this action might be acceptable in light of the need to hold down costs.

The supply of reserve manpower is another potential constraint. Adequate numbers of reservists in the areas where additional reserve ships are homeported would be necessary. Some additional reserve manpower may already be available. One recent study found that if reserve manning had been limited to 90 percent of wartime requirements, eight major U.S. localities would have had sufficient reserve personnel in 1980 to support training missions for either one destroyer (DD-931) or one amphibious (LST) class ship. ^{5/} It may also be possible to meet some or all needs for more reserves from increases already planned for 1984 through 1988. Thus, it seems likely that sufficient manpower would be available to support an expansion of the reserve force such as that shown in Table 12.

Finally, transfer of more ships to the reserves would also slow mobilization during a national emergency, since ships manned with 50 percent reservists would take longer to deploy. Nonetheless, the President has authority to recall up to 100,000 reservists without requesting Congressional approval, a policy designed to speed mobilization during an emergency.

5. See Michael Hoert, An Analysis of Candidate Ship Classes As Potential Naval Reserve Trainees, Master's Thesis (Naval Postgraduate School, March 1980), Chapter III and Table 10.

Reduce Active-Duty Personnel Assigned to Shore Duty

In 1984, the largest portion of Navy manpower--about 300,000 civilians and over 200,000 active-duty personnel--will be utilized in shore facilities. In addition, 40,000 Selected Reserve billets are at shore installations and 12,000 reserve personnel work full time in support of active forces.

Determining the best manpower mix between civilian and military personnel in shore jobs is complicated by the need for rotation billets. As discussed previously, the Navy tries to balance the time individuals spend at sea and ashore. At present one-third of the enlisted force are assigned tours that leave them at sea 50 percent of the time or less (see Table 13). Most sailors, however, spend a greater proportion of time at sea, some of them as much as 72 percent. The average "sea/shore rotation ratio" for Navy enlisted personnel is currently about 3:2--that is, three years at sea followed by two years ashore, or 60 percent of a tour.

TABLE 13. SEA/SHORE ROTATION RATIOS AND PERCENT OF TOUR ON SEA DUTY BY PERCENT OF ENLISTED FORCE, FISCAL YEAR 1983

Sea/Shore Rotation Ratio	Percent of Tour on Sea Duty	Percent of Enlisted Force
5:2	72	15.2
4:2	67	38.4
3:2	60	5.0
4:3	57	5.5
3:3	50	23.8
Variable	less than 50	12.1

SOURCE: U.S. Navy.

To reduce the requirement for active-duty shore billets, which are used primarily for rotation purposes, the Navy could increase the rotation ratios so as to keep some sailors assigned to sea duty for longer periods of

time. Since most new recruits enlist for four years and spend a fixed period on sea duty (between two and three years), the burden of longer tours at sea would fall upon those who reenlist--that is, on the career force.

CBO estimated the effect on enlisted career requirements of increasing the current 3:2 average sea/shore rotation ratio to 3.5:2 over a period of three years. Only half of the enlisted force was assumed to be affected--those currently serving 60 percent or less time at sea (that is, with sea/shore rotation ratios of 3:2, 4:3, and 3:3). Sea tours for others were judged too long to be eligible for further extension. If each sea tour was extended by three months (and conversely, each shore tour decreased by three months) for half the enlisted force the Navy would require 4,500 fewer shore billets in 1984 and 14,500 fewer billets in 1988 for rotation purposes (see Table 14).

TABLE 14. ALTERNATIVE SEA/SHORE ROTATION POLICIES
(In thousands of career enlisted personnel)

	1984	1985	1986	1987	1988
Sea Billet Requirement	141.0	146.5	150.0	151.0	152.0
Shore Billet Requirement					
Current policy 3:2	94.0	97.6	100.0	100.7	101.3
Alternative policy 3.5:2 <u>a/</u>	89.5	88.6	85.7	86.3	86.8
Reduction	4.5	9.0	14.3	14.4	14.5

- a. The alternative policy is assumed to take three years (1984-1986) to be fully implemented.

Effects on Productivity. Increasing the sea/shore rotation ratios would shift active-duty manpower from shore to sea billets. This could improve the fleet's readiness, since enlisted personnel are generally more productive in billets where their primary training is applicable. Nor should

the shift prevent the Navy from carrying on necessary shore operations. Unfortunately, it is difficult to assess fully the impact of lower shore manning on Navy operations because the system for determining shore requirements is less complete than for ship and squadron billets. To date, less than 50 percent of the authorized Navy shore jobs have validated standards relating workloads to manpower requirements. 6/ Nevertheless, the decreases in active-duty shore manpower shown in Table 14 are relatively small--less than 3 percent of the total military and civilian shore personnel. The Navy could probably adjust its shore workload to offset this reduction, especially since some shore billets are required primarily to maintain adequate rotation.

Additional Sea Pay. While not likely to harm productivity, lengthening sea tours would have a negative effect on retention since it would reduce the time spent ashore with families. Two studies of the factors affecting Navy retention have attempted to measure the impact of sea/shore rotation. Both found an inverse relationship between the proportion of time at sea and the reenlistment patterns for personnel completing four years of service. Using these studies, CBO estimated that an increase in the average rotation ratio from 3:2 to 3.5:2 over the next three years would mean that the Navy's career force would be 1,000 smaller in 1984 and 3,000 smaller in 1988. 7/

Such a decline would be inconsistent with the Navy's desire to increase the size of its career force. Offering additional sea pay would increase

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6. The Navy is currently developing a system (SHORESTAMPS) for determining shore based work requirements covering both military and civilian personnel. At the end of 1983, 251,000 jobs will be included, representing 47 percent of all shore positions. See Manpower Requirements Report, FY 1984, Department of Defense (February 1983), page IV-3.
 7. See M. Goldberg and John Warner, The Influence of Non-Pecuniary Factors on Labor Supply (Center for Naval Analysis, December 1981), pp. 20-21; and David Rodney and others, The Impact of Selective Reenlistment Bonuses upon First- and Second-Term Retention (Rehab Group Inc., July 1980). In these studies, the sea/shore elasticities--measuring the percentage change in reenlistment rates for a 1 percent change in proportion of time at sea--were estimated to range from -0.34 to -0.79 at the mean values for first-term reenlistment rates. These results imply that in Navy occupations where sea/shore rotation is 4:2 or greater, reenlistment rates will be 3 to 5 percent lower than in occupations with 3:2 or 3:3 rotation ratios.

willingness to reenlist and extend duty for longer sea tours. (The Navy's recent experience with the sea pay increases enacted in 1980 also confirms this result.) Based on the results of previous studies, CBO estimates that offsetting the declines in retention calculated above would require an average annual increase in sea pay of \$250 per Navy reenlistee. ^{8/} Since all career enlisted personnel who serve at sea would receive the increase—not only those reenlisting—this policy would eventually cause the Navy's sea pay budget to rise by about \$30 million, or 16 percent above that currently planned for 1984 (see Table 15).

These added costs would, however, be more than offset by reducing the number of enlisted personnel assigned to shore duty. Indeed, net savings from these changes would amount to \$31 million in 1984 and would total \$920 million over the period 1984–1988 (see Table 15).

These results have important policy implications. They suggest that the Navy could meet manning goals at less cost by raising sea pay and extending sea tours than by holding sea tour length constant and increasing the total size of the Navy. Obviously, there are limits to this approach; it can only be used where sea/shore rotation rates are not already high. But it may be a useful approach if it can be limited to those who now spend 60 percent or less of their time at sea, the option presented in this paper.

Indeed, the Navy itself has taken a similar approach in previous years. For example, in 1976, the Navy increased enlisted sea tours by an average of three months under the Fleet Readiness Improvement Program (FRIP). Over 6,000 career enlisted personnel were transferred to sea billets from shore billets. This policy was continued until late 1978 when the rotation ratios were reduced to help offset declining enlisted retention. The 1978 change emphasizes the importance of coupling any actions to increase sea/shore rotation with increases in sea pay to offset adverse effects on retention.

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8. This estimate was made using a sea/shore rotation elasticity of -0.55, a pay elasticity of 2.5 for Navy first-term reenlistments, and a base reenlistment rate of 40 percent. Under these assumptions, the average annual pay increase required to offset the effect of a 3.5:2 rotation policy is 1.4 percent. Assuming that all career personnel serving in sea billets receive this percentage increase, an average pay base of \$17,775 for E-4 to E-9 personnel and estimated 1984 sea pay rates, the average annual sea pay increase required is \$250 per billet.

TABLE 15. SAVINGS (COSTS) FROM REDUCING THE ACTIVE FLEET SIZE AND THE NUMBER OF ENLISTED PERSONNEL ON SHORE DUTY, FISCAL YEARS 1984-1988
(In millions of current year dollars)

	1984	1985	1986	1987	1988	Total 1984-1988
<hr/>						
Reduce the Active Fleet and Increase the Reserve Fleet						
Active-duty and Reserve personnel costs	18.0	50.0	76.0	103.0	146.0	391.0
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Increase Sea/Shore Rotation for Enlisted Personnel						
Active-duty personnel costs	41.0	130.0	237.0	307.0	325.0	1,040.0
Additional sea pay	(+10.0)	(+20.0)	(+30.0)	(+30.0)	(+30.0)	(+120.0)
Total	31.0	110.0	207.0	277.0	295.0	920.0
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